New Partnerships for Rapid Environmental Water Quality Assessments in Boreholes

James Ursic
Geologist
U.S. EPA Region 5 Superfund
(312) 353-1526
Ursic.James@epa.gov

Authors: James Ursic
U.S. EPA Region 5 Superfund
Keywords: well(s), water quality, assessment tool, borehole logging, chemical parameters

Environmental Issue Being Addressed

Water quality assessments using existing or planned wells can provide significant information concerning contamination at a site. If some of this information could be acquired rapidly and without laboratory analysis, many resources could be conserved. Such a system must be capable of operating in diverse conditions. For example it would need to:

• Be small enough to enter two-inch diameter monitoring wells
• Be mechanically robust to withstand the extreme pressures of deeper municipal water supply wells
• Contain multiple water quality sensors
• Include an acquisition system capable of rapidly collecting data while moving in a water column
• Be compatible with winch and operating systems common to the industry
• Offer real-time data outputs.

Scientific Approach to Resolving the Issue

Research indicated that Italian oceanographic water quality investigations use specialized tools for deep water characterization. A review of this technology found that it could easily be incorporated into borehole environmental investigations. To apply this technology, cabling and software modifications were required in order to match commonly used borehole winch systems.

Partnerships in Both Conducting the Work and Applying the Results

The U.S. Environmental Protection Agency (U.S. EPA), in partnership with the U.S. Geological Survey's Borehole Research Group in Denver, CO, agreed to evaluate the tool at environmental sites. Modifications to the tool were needed and arrangements were made with the tool's manufacturer, Idronaut s.r.l. of Italy, and a U.S. borehole tool manufacturer in Denver, Mount Sopris Instruments. The modifications allow the tool to operate with two of the most commonly used borehole logging systems in the United States. Programs were also written allowing real-time data outputs with options for configuration changes and calibrations, all operated from the logging operator's console.

Impact the U.S. EPA Science Has Made or Expects to Make on the Issue

This investigation, initiated by the U.S. EPA, will provide the basis to rapidly evaluate water quality in wells with diameters of two inches or greater. The tool's seven sensors are capable of measuring specific changes in chemistry that could isolate anomalous areas of concern in a borehole. This would allow depth-specific samples to be extracted for laboratory analysis. The

tool’s adaptability to operate on most commercial borehole systems means that contractors could purchase or rent this tool and use it on their own system for environmental investigations.